

Name: _____

This review is not comprehensive. Please be sure to study your notes and homework assignments as well.

- 1) What is the value of $\sum_{k=1}^4 (2k+1)$?
 A) 15 B) 10 C) 4 D) 24
- 2) What is the value of $\sum_{m=1}^3 (2m+1)^{m-1}$?
 A) 245 B) 57 C) 55 D) 15
- 3) A ball is dropped from a height of 8 feet and allowed to bounce. Each time the ball bounces, it bounces back to half its previous height. The vertical distance the ball travels, d , is given by the formula $d = 8 + 16 \sum_{k=1}^n \left(\frac{1}{2}\right)^k$, where n is the number of bounces. Based on this formula, what is the total vertical distance that the ball has traveled after four bounces?
 A) 15.0 ft B) 22.0 ft C) 8.9 ft D) 23.0 ft
- 4) Evaluate: $2 \sum_{n=1}^5 (2n-1)$
- 5) Evaluate: $\sum_{k=2}^4 (4-k)^2$
- 6) What is the formula used for finding the sum of n terms of an arithmetic series?
 A) $S_n = n(a_n - 1)$ C) $S_n = \frac{n}{2}(2a + (n-1)d)$
 B) $S_n = 2n(a+1)$ D) $S_n = \frac{n}{2}(a+2\ell)$
- 7) What is the sum of the series $3 + 19 + 35 + \dots + 307$?
 A) 3,100 B) 2,790 C) 2,945 D) 3,040

1) $\sum_{x=1}^4 (2x+1)$

..... 24

2) $\sum_{x=1}^3 ((2x+1)^{x-1})$

..... 55

3) $8 + 16 \sum_{x=1}^4 \left(\frac{1}{2}^x\right)$

..... 23

4) $2 \cdot \sum_{n=1}^5 (2n-1) = 2 (\text{Summation Answer})$

multiply the sum by 2

$(2(1)-1) + (2(2)-1) + (2(3)-1) + (2(4)-1) + (2(5)-1)$

$1 + 3 + 5 + 7 + 9$

$\rightarrow 25$

$2(25) = \boxed{50}$

5) $\sum_{k=2}^4 ((4-k)^2)$

$(4-2)^2 + (4-3)^2 + (4-4)^2$

$4 + 1 + 0$

$\boxed{5}$

$$6) \text{ Sum} = \frac{n}{2} (a_1 + a_n)$$

$$= \frac{n}{2} (a_1 + a_1 + d(n-1))$$

$$a_n = a_1 + d(n-1)$$

$$C) = \frac{n}{2} (2a_1 + d(n-1))$$

$$7) \text{ Sum} = \frac{n}{2} (a_1 + a_n)$$

$$n = 20 \quad S = \frac{20}{2} (3 + 307)$$

$$a_1 = 3 \quad = 10 (310)$$

$$a_n = 307 \quad = \boxed{3100} \text{ (A)}$$

$$a_n = a_1 + d(n-1)$$

$$307 = 3 + 16(n-1)$$

$$\begin{array}{r} 307 \\ - 3 \\ \hline 304 \end{array} \quad \begin{array}{r} 16(n-1) \\ - 16 \\ \hline 304 \end{array}$$

$$\frac{304}{16} = \frac{16(n-1)}{16}$$

$$19 = n-1$$

$$\begin{array}{r} 19 \\ + 1 \\ \hline 20 = n \end{array}$$

$$8) \text{ Sum} = \frac{n}{2} (a_1 + a_n)$$

$$a_1 = 7$$

$$a_n = 205$$

$$n = 100$$

$$\text{Sum} = \frac{100}{2} (7 + 205)$$

$$= 50 (212)$$

$$= \boxed{10600} \text{ (A)}$$

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- 8) What is the sum of the arithmetic series where $n = 100$, $t_1 = 7$, and $t_{100} = 205$?
 A) 10,600 B) 9,960 C) 11,000 D) 10,000
- 9) What is the sum of the first five terms of an arithmetic series if the first term is 6 and the common difference is -2?
 A) 25 B) 10 C) 20 D) 14
- 10) Given the arithmetic sequence 11, 5, -1, ..., find S_{30} . [Show all work.]
- 11) The local baseball team is advertising a special deal on ticket prices. The cost of the first ticket to a game is \$12 and every ticket after that costs \$0.25 less. If the maximum number of tickets you can buy is 30, what is the total cost of 30 tickets?
- 12) What is the sum of the first 5 terms of the geometric series $1 + 3 + 9 + \dots + 19,686$?
 A) 212 B) 58 C) 121 D) 364
- 13) The sum of a geometric series of six terms with ratio 2 is -126. What is the first term?
 A) 2 B) $\frac{43}{31}$ C) 6 D) -2
- 14) How many terms are there in a geometric series if the first term is 3, the common ratio is 2, and the sum of the series is 93?
 A) 5 B) 6 C) 3 D) 4
- 15) Find the sum of the geometric sequence 3, 6, 12,, 768.
- 16) A blacksmith agreed to shoe a horse on the condition that he would be paid one cent for the first nail, two cents for the second nail, four cents for the third, and so on. If each shoe requires eight nails, how much will the blacksmith receive for shoeing the horse? [Show all work.]
- 17) A man sends out 3 letters on Saturday with instructions to the recipients to write to three friends (asking them to do the same) by the following Saturday. If there are no duplications and no one breaks the chain, how many letters are sent in the first six Saturdays?

Geometric

$$a_1 = 3$$

$$r = 3$$

$$n = 6$$

$$\text{Sum} = \frac{3(1-3^6)}{1-3}$$

$$= \boxed{1092} \text{ letters}$$

$$9) \text{ sum} = \frac{n}{2}(a_1 + a_n) \quad a_n = a_1 + d(n-1)$$

$$n = 5 \quad = \frac{5}{2}(6 + (-2)) \quad = 6 + (-2)(5-1)$$

$$a_1 = 6 \quad = -2$$

$$a_n = -2 = \boxed{10} \text{ (B)}$$

11, 5, -1 $d = -6$

$$10) \quad a_n = 11 + (-6)(30-1)$$

$$n = 30 \quad = 11 + (-6)(29)$$

$$a_1 = 11 \quad S_{30} = \frac{30}{2}(11 + (-163)) \quad = -163$$

$$a_n = -163 \quad = 15(-152)$$

$$= \boxed{-2280}$$

$$11) \quad 12, \overset{-0.25}{11.75}, 11.50, \dots$$

$$n = 30 \quad a_n = 12 + (-0.25)(30-1)$$

$$a_1 = 12 \quad \text{sum} = \frac{30}{2}(12 + 4.75) \quad = 12 - 0.25(29)$$

$$a_n = 4.75 \quad = 15(16.75) \quad = 4.75$$

$$= \boxed{\$251.25}$$

$$12) \text{ sum} = \frac{a_1(1-r^n)}{1-r}$$

$$n = 5$$

$$a_1 = 1 \quad \text{sum} = \frac{1(1-3^5)}{1-3} = \boxed{121}$$

$$r = \frac{3}{1} = 3$$

$$13) \text{ sum} = \frac{a_1(1-r^n)}{1-r}$$

$$-126 = \frac{a_1(1-2^6)}{1-2}$$

$$-126 = \frac{a_1(-63)}{(-1)}$$

$$\frac{-126}{63} = \frac{a_1(63)}{63}$$

$$\boxed{-2 = a_1} \text{ (D)}$$

$$14) a_1 = 3$$

$$r = 2$$

$$\text{Sum} = 93$$

$$93 = \frac{3(1-2^n)}{1-2}$$

$$93 = \frac{3(1-2^n)}{-1}$$

$$\frac{93}{-3} = \frac{-3(1-2^n)}{-3}$$

$$\frac{-31}{-1} = \frac{1-2^n}{-1}$$

$$\frac{-32}{-1} = \frac{-2^n}{-1}$$

$$32 = 2^n$$

$$2^5 = 2^n$$

$$(n=5) \quad (A)$$

$$15) \text{Sum} = \frac{a_1(1-r^n)}{1-r}$$

$$a_1 = 3$$

$$r = \frac{6}{3} = 2$$

$$n = 9$$

$$\text{Sum} = \frac{3(1-2^9)}{1-2}$$

$$\text{Sum} = \boxed{1533}$$

To find n :

$$a_n = a_1 \cdot r^{n-1}$$

$$\frac{768}{3} = \frac{3 \cdot (2)^{n-1}}{3}$$

$$256 = 2^{n-1}$$

$$2^8 = 2^{n-1}$$

$$8 = n-1$$

$$9 = n$$

$$16) a_1 = .01 \text{ (1 cent)}$$

$$r = 2 \text{ (double every time)}$$

$$n = 32 \text{ (8 nails per shoe and a horse has 4 shoes)}$$

$$\text{Sum} = \frac{.01(1-2^{32})}{1-2}$$

$$= \$42,949,672.95$$

Wow!